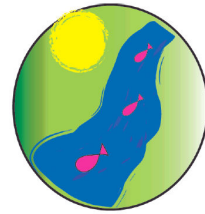




2009 Chesterfield WaterTrends Report of the Quality of Select Streams, Rivers and Lakes in Chesterfield County, Virginia



pH analysis at Swift Creek near Bailey Bridge Middle School. Photo courtesy of Roy Tedesco

**Chesterfield County
Department of Environmental Engineering
Water Quality Section
and
Friends of Chesterfield's Riverfronts
March 2010**

Executive Summary

Water quality investigations were made at five streams, two rivers and within two lake stations by volunteers in Chesterfield County during 2009. A basic suite of parameters was measured at each site and included pH, dissolved oxygen, water temperature and clarity. Water depth was recorded at all lake sites and at one river site. Ambient air temperature was additionally noted. Observations of general water conditions, water color, odors, debris, plants and wildlife were also recorded. An additional assessment on a reach of Johnson Creek was conducted using the Virginia Save Our Streams Low Gradient Stream Habitat protocol.

Observations of pH indicated that the all measurements made during 2009 fell within the acceptable 6.0 to 9.0 unit range specified by the Virginia Department of Environmental Quality. Overall, pH values among all sites were similar to those observed during 2008. Dissolved oxygen concentrations were excellent among all sites with only a few observations not meeting the minimum 4.0 mg/L VADEQ standard. During the summer months, low dissolved oxygen was observed at two stations (Swift Creek and Walton Lake). Monthly median temperatures and individual measurements varied normally according to season. Air temperature at all stations varied normally with season during 2009. Water clarity was measured by use of a 120 centimeter turbidity tube or a standard eight-inch Secchi disk. The greatest annual median transparencies (≥ 130.0 cm) were observed in Swift Creek and within Spring Run. The least clear waters were observed at Nuttree Branch (annual median transparency = 51.0 cm). Compared to 2008, increases in clarity as measured by annual median transparency were observed at four stations, decreases were noted at three and two exhibited no change.

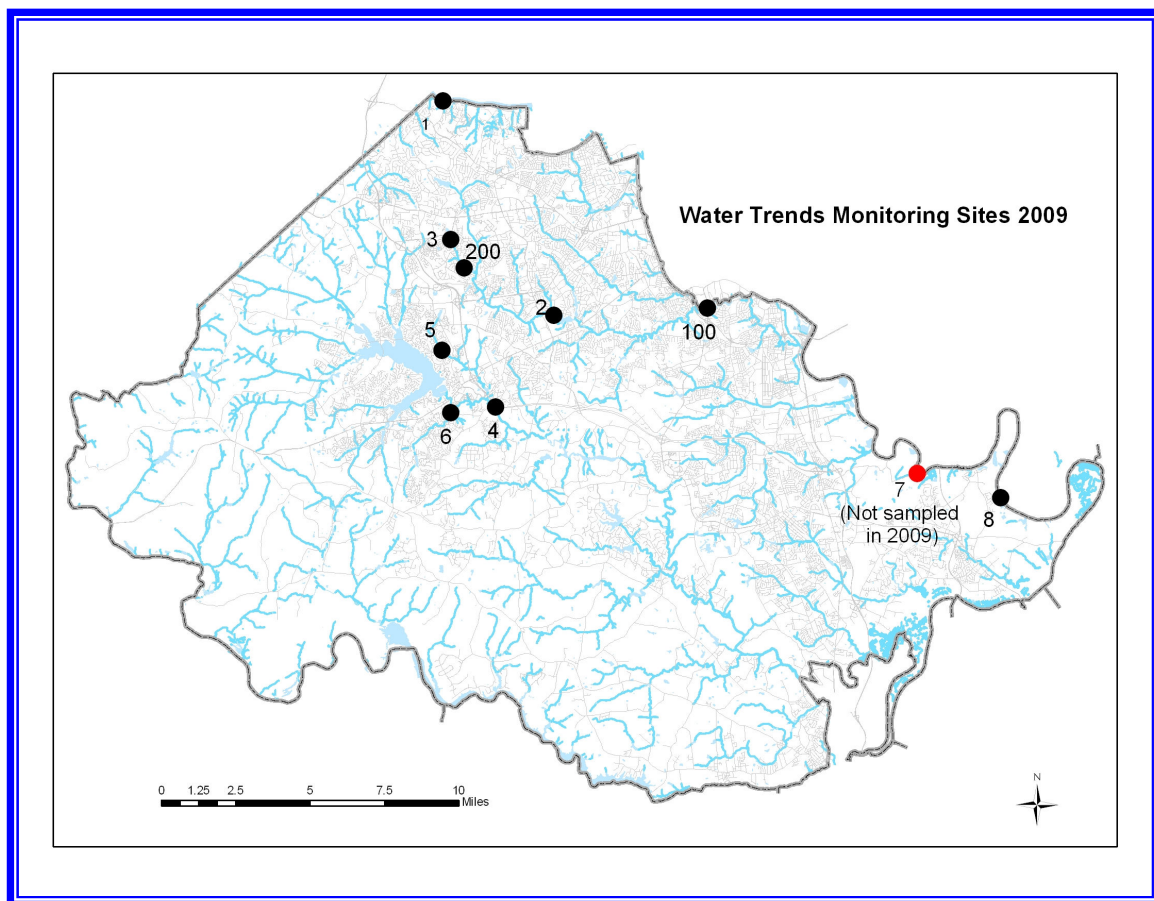
Overall, the monitored waters were stained brown to various degrees with green colors frequently recorded. Water odors were rarely perceived and recorded. As in past reports, the most common “trash” item continued to be litter and leaves/debris from the watersheds. Additionally, algae and pollen were frequently noted on the water surface or within the water column at several sites during 2009. A variety of wildlife was observed to include numerous waterfowl, fish, frogs, snakes and Bald Eagles.

On October 8, 2009, a stream reach along Johnson Creek near the intersection of Route 10 and Enon Church Road was assessed using the Virginia Save Our Streams Low Gradient Stream Habitat Assessment Protocol. This initial habitat assessment conducted in 2009 indicated a “Suboptimal” condition with a total score of 150 points. Overall, the stream was described as being “in very good condition” by the monitor.

Introduction

This report presents the water quality data collected by volunteer monitors in the Chesterfield WaterTrends Program. Historically, volunteers collected water quality monitoring data through separate programs coordinated by Chesterfield County's Department of Environmental Engineering Water Quality Section and Friends of Chesterfield's Riverfront. The Chesterfield WaterTrends Program began in 2008 when these two separate elements were combined into one program jointly coordinated by the Chesterfield County Water Quality Section and Friends of Chesterfield's Riverfront. Chesterfield WaterTrends sites include streams, rivers and lakes. Monitors collect data on a volunteer basis to indicate a general state of water quality. Additionally, habitat evaluations are performed at stream reaches in the county using the Virginia Save Our Streams Low Gradient Stream Habitat Assessment protocol. The WaterTrends program is included as a monitoring and outreach component of VPDES Permit VA0088609 administered by the Chesterfield County Department of Environmental Engineering's Water Quality Section.

Map 1. WaterTrends Volunteer Monitor Sites, 2009



Chesterfield WaterTrends sites were chosen by residents with an interest in the health of their local waterbody and in areas where primary contact may occur (areas with public access and recreational opportunities). Chesterfield WaterTrends trainings are held two

times per year in conjunction with a recertification session. Trainings were offered in the spring and fall. Monitors who have received training were asked to commit to the program for a period of at least one year. After their first year in the program, monitors were asked to attend an annual recertification session each subsequent year to keep their skills current. A total of five stream sites, two river sites and two lakes were monitored as part of the program in 2009. An additional reach was evaluated using the Virginia Save Our Streams Low Gradient Stream Habitat Assessment protocol. In the fall 2009 training session, 10 new volunteers joined the program. These volunteers will begin monitoring six new sites in 2010. In addition, five sites were added in 2009 for low gradient habitat assessments using the Virginia Save Our Streams protocol although only one of these sites was assessed during 2009. A training session for the Virginia Save Our Streams Low Gradient Stream Habitat Assessment protocol was conducted for twelve volunteers in June 2009.

Methods

A Station ID was assigned to each Chesterfield WaterTrends site. All stream and river sites were assigned a single digit number. All lake sites were given a triple digit number, where the first two digits represent the lake and the last digit denotes the site on the lake. The sampling frequency for sites in the Chesterfield WaterTrends Program varies. Lake sites were sampled at least once per month at multiple stations during the growing season (approximately April – October) from docks or boats. Streams and rivers were monitored year round at least one time per month with some being monitored as frequently as weekly. A core suite of parameters was measured at each site that includes pH, dissolved oxygen, water temperature and turbidity. Water depth was recorded at lake sites and some stream and river sites. Ambient air temperature is also noted. Observations of general water conditions, water color, odors, debris, plants and wildlife are also recorded.

Chesterfield WaterTrends volunteers use an armored Celsius thermometer to record water and air temperature. Dissolved oxygen was measured using a modified Winkler titration (LaMotte#5860) and pH was measured using a precision pH kit (LaMotte#5858). Turbidity was measured at lakes and most river sites using a standard eight-inch diameter Secchi disk. At most, stream sites a 120-centimeter turbidity tube is used to measure water clarity (turbidity). Trophic State Index values were calculated for lakes in the Chesterfield WaterTrends Program. Water depth is determined using the Secchi disk as a sounding line. In all instances when possible, duplicate measurements were made to verify readings.

Datasheets were completed in the field and entered into an electronic spreadsheet by each Chesterfield WaterTrends monitor. The electronic spreadsheets and datasheets were sent quarterly to the data coordinator. The spreadsheets are compiled and quality control was performed by the Quality Control Officer before they are uploaded into the Department of Environmental Quality's Virginia Volunteer/Non-Agency Monitoring Database.

The Virginia Save Our Streams Low Gradient Stream Habitat Assessment protocol was used once in 2009 to describe the instream and riparian characteristics a single site. The

protocol was based upon the US Environmental Protection Agency's Habitat Assessment for Low Gradient Streams with the results comparable across sites and watersheds. The approach assigns numerical values to ten (10) individual parameters that were summed to obtain a final overall score. These individual numerical values and the final score are representative of four condition categories described as "Poor", "Marginal", "Suboptimal" and "Optimal."

Station Descriptions and Data Summaries

The following pages describe each site and a summary of the data and observations made during 2009. Monthly and annual median values for each monitored parameter are calculated and outlined in each site summary table when applicable. Associated maps and depict the sampling station locations. The James River site at Henricus Park (Station 7) monitored in 2008 was not assessed in 2009 but will be sampled in 2010 by a new volunteer. Results of the Low Gradient Stream Habitat Assessment performed in 2009 were presented in the discussion portion of this report. Specific field data sheets for each site and monitoring survey are included in Appendix A.

Station ID: 1

Site: James River at Robious Landing Park

Latitude: 37.5591

Longitude: 77.6469

Watershed: James River

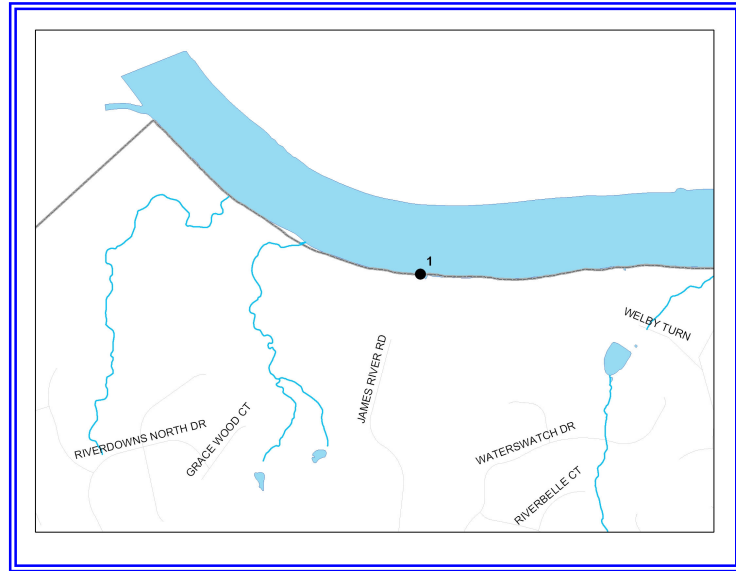
Land use: Mixed

Number of Stations: 1

Number of Monitors: 3

Volunteer Hours: 33.5

Monitoring since: August 2001



This site is located on the James River in the Northern portion of Chesterfield County within the Robious Landing county park. River measurements and water samples were obtained from the wooden boat dock or ramp at the park at least once every two weeks. A total of 25 surveys were conducted during 2009.

Table 1-1. Monthly and annual median values for each water quality parameter measured, 2009.

<u>Date</u>	<u>n</u>	<u>Water Depth</u> <u>(m)</u>	<u>Transparency</u> <u>(cm)</u>	<u>pH</u> <u>(units)</u>	<u>Dissolved Oxygen</u> <u>(mg/L)</u>	<u>Surface temperature</u> <u>(°C)</u>	<u>Air Temperature</u> <u>(°C)</u>
January	2	*	56.5	7.5	11.4	4.3	11.5
February	1	*	92.0	7.0	11.2	5.5	17.0
March	3	*	68.3	7.0	9.7	10.5	24.0
April	2	*	85.1	7.0	8.1	15.5	21.5
May	2	*	25.5	7.3	6.9	21.5	25.5
June	3	*	43.8	7.0	6.1	26.0	27.5
July	2	*	125.5	7.8	7.1	17.5	25.8
August	2	*	125.5	7.8	7.0	28.5	26.5
September	2	*	125.5	8.0	7.6	24.5	21.5
October	2	*	125.5	7.8	8.6	16.8	13.5
November	2	*	79.5	7.3	9.6	10.5	10.5
December	2	*	39.7	7.0	10.8	6.0	3.8
2009 Annual Median		*	92.0	7.5	7.8	15.5	22.0
2008 Annual Median		*	120.0	7.5	8.2	15.5	16.0

Sampling of the James River at Robious Landing Park was conducted from January through December during 2009. Sampling occurred mostly on sunny and clear days (15 surveys) with partly cloudy and/or overcast conditions recorded on the remaining 10 site visits. Normal “baseflow” conditions were noted on ten dates, high or elevated flows on 10 visits and low flows on five occasions. Water color ranged from “clear” and “normal” during baseflow to brown and turbid during the higher flows. A “green” color was noted during July. Leaves and debris followed by “seaweed” were the most often recorded

floatables in the water. With the exception of two instances of “earthy” odors noted during the spring, the waters of this site were clear of odors for 2009.

As in 2008, water depth was not measured at this site during 2009. Monthly median transparency values ranged from a low of 25.5 centimeters in May following heavy rains to 125.5 centimeters during the period of July through October. The annual median transparency value (92.0 cm) was much lower compared to the 2008 annual median (120.0 cm) suggesting a slight loss of water clarity at this site. As noted during the previous year, all monthly median pH values during the 2009 were within the 6.0 - 9.0 unit standard range set by the Virginia Department of Environmental Quality (VADEQ). Additionally, no individual pH measurements violated the VADEQ standard during 2009. Monthly median surface temperatures ranged from 4.3 to 28.5°C and varied normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. All individual dissolved oxygen concentrations were well above VADEQ’s 4.0 mg/L limit and were indicative of well oxygenated waters. Despite the slight loss of clarity, overall observations were indicative of good water quality at this site.

Station ID: 2

Site: Tributary to Falling Creek in Rockwood Park

Latitude: 37.4542

Longitude: 77.5804

Watershed: Falling Creek

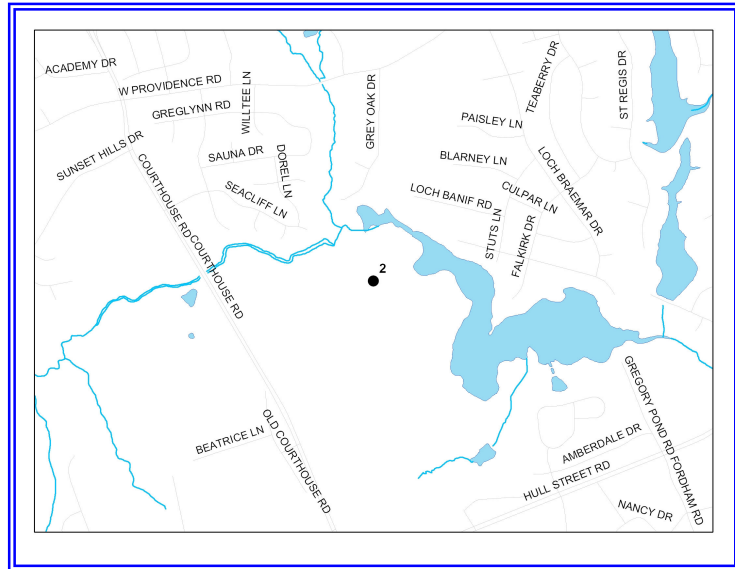
Land use: Residential,
County Park

Number of Stations: 1

Number of Monitors: 3

Volunteer Hours: 77.2

Monitoring since: August 2001



This site is located on an unnamed tributary to Falling Creek in the North Central portion of Chesterfield County within Rockwood Park. Stream measurements and water samples were obtained from the wooden bridge one quarter of a mile past the nature center generally on a weekly schedule. A total of 39 surveys were conducted during 2009.

Table 1-2. Monthly and annual median values for each water quality parameter measured, 2009.

Date	n	Water Depth (m)	Transparency (cm)	pH (units)	Dissolved Oxygen (mg/L)	Surface temperature (°C)	Air Temperature (°C)
January	5	*	85.0	6.5	11.9	3.0	4.5
February	4	*	99.0	6.5	11.5	5.0	3.5
March	4	*	86.5	6.5	9.1	9.3	15.3
April	2	*	97.8	6.5	9.2	12.0	17.0
May	2	*	121.1	6.5	6.1	18.8	24.0
June	2	*	122.0	6.5	5.5	22.5	24.0
July	2	*	122.0	6.5	5.7	22.0	25.0
August	5	*	122.0	6.5	5.1	24.0	24.0
September	3	*	121.0	6.5	6.3	19.0	20.0
October	4	*	122.0	6.5	7.1	15.0	18.5
November	4	*	81.8	6.5	8.7	9.8	13.5
December	2	*	55.9	6.5	9.6	7.3	10.8
2009 Annual Median			118.0	6.5	8.1	12.0	17.5
2008 Annual Median		*	90.6	6.5	7.2	16.5	22.0

Sampling of this tributary to Falling Creek was conducted from January through December of 2009. Thirteen of the 39 monitoring events occurred during sunny and clear days. Cloudy and/or overcast days were noted for the remainder of the surveys and light rain occurred during two events (March and September). Normal “baseflow” conditions were noted on all but four of the sampling dates during 2009. High or “flood” water was recorded for these four surveys, all of which occurred in the autumn months

(late September to early December). Water color ranged from “clear” on three occasions to “cloudy” and “light brown” on the remainder of visits. No unusual floatables or odors were recorded for 2009.

As in 2008, water depth was not measured at this site during 2009. Monthly median transparency values ranged from a low of 55.9 centimeters in December to 122.0 centimeters in June, July, August and October. The annual median value (118.0 cm) was reflective of generally clear waters and indicated a general improvement in clarity as compared to the annual median of 2008 (90.6 cm). All monthly median pH values during the year were all within the 6.0 - 9.0 unit standard range set by VADEQ. Additionally, no individual pH measurements violated the VADEQ standard during 2009. As noted in the previous year, measurements of pH did not vary substantially month to month during 2009 indicating a relatively stable system. Monthly median surface temperatures ranged from 3.0 to 24.0°C and varied normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. All individual dissolved oxygen concentrations noted during 2009 were well above VADEQ’s 4.0 mg/L limit and were indicative of well oxygenated waters. The annual median dissolved oxygen concentration (8.1 mg/L) was greater than the 2008 annual median (7.2 mg/L) and was reflective of improved conditions at this reach. Overall improvements in clarity and oxygen content combined with continued acceptable and stable pH and temperature measurements are suggestive of excellent water quality at this site.

Station ID: 3

Site: Tributary to Falling Creek in Midlothian Mines Park

Latitude: 37.4917

Longitude: 77.6429

Watershed: Falling Creek

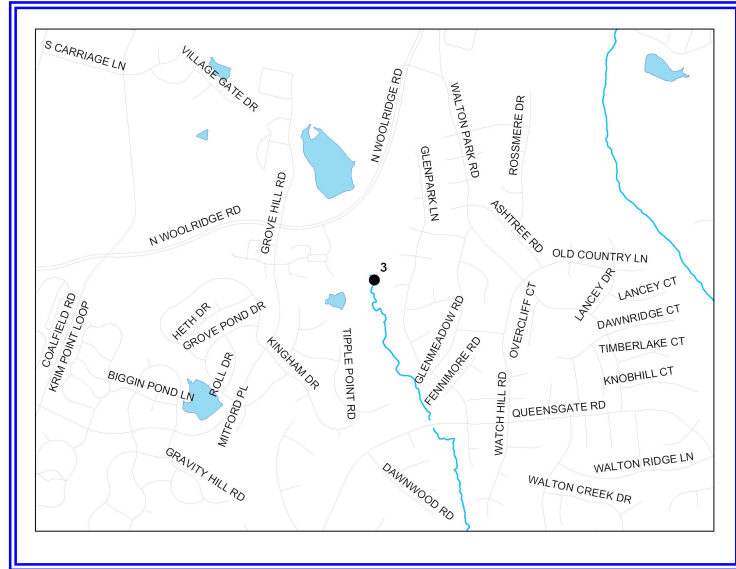
Land use: Residential, County Park

Number of Stations: 1

Number of Monitors: 3

Volunteer Hours: 38.0

Monitoring since: June 2008



This site is located on an unnamed tributary to Falling Creek in the Northern portion of Chesterfield County within Midlothian Mines Park. Measurements and water samples were obtained from where the stream crosses the end of the abandoned railway bed trail. This trail is accessed from the parking area located off North Woolridge Road. The stream was visited generally once every two weeks with 19 surveys conducted during 2009.

Table 1-3. Monthly and annual median values for each water quality parameter measured, 2009.

<u>Date</u>	<u>n</u>	<u>Water Depth</u> <u>(m)</u>	<u>Transparency</u> <u>(cm)</u>	<u>pH</u> <u>(units)</u>	<u>Dissolved Oxygen</u> <u>(mg/L)</u>	<u>Surface temperature</u> <u>(°C)</u>	<u>Air Temperature</u> <u>(°C)</u>
April	2	*	46.2	6.5	9.3	15.3	16.0
May	2	*	51.6	7.0	7.8	20.5	18.5
June	3	*	78.6	7.0	6.0	25.0	26.0
July	2	*	71.0	7.0	5.9	27.0	28.5
August	1	*	83.7	6.0	5.4	30.0	31.5
September	2	*	42.1	6.0	6.0	21.3	21.8
October	2	*	96.4	6.0	7.7	15.0	16.8
November	3	*	25.8	6.0	8.4	15.0	17.0
December	2	*	26.6	6.5	10.9	6.0	9.5
2009 Annual Median		*	52.8	6.0	7.5	19.0	21.0
2008 Annual Median		*	42.4	6.0	7.0	20.3	21.5

Sampling of this tributary to Falling Creek was conducted from April through December of 2009. Eleven the monitoring events occurred during sunny and clear days with the other remaining eight conducted on cloudy and/or overcast days. On one event during September, showers were noted. Normal “baseflow” conditions were noted on six survey and high flows were observed on five. Low flow conditions were observed eight times

between June and October, approximately the same period noted for low flow the previous year. Water color again ranged from clear through varying shades of brown. Milky conditions were observed in September corresponding to “negligible” flow. When present (five instances), leaves were the most frequently observed “floatable” in the stream. “Earthy” odors were recorded during late November and early December.

As in 2008, water depth was not measured at this site during 2009. Monthly median transparency values ranged from a low of 25.8 centimeters in November to 96.4 centimeters in October. While the annual median value (52.8 cm) was slightly better than the 2008 annual median value (42.4 cm), transparency was still reflective of generally cloudy waters and was among lowest annual medians observed among all sites during 2009. As in the previous year, all monthly median pH values during the year were either at the minimum 6.0 unit threshold or within the 6.0 - 9.0 unit standard range set by VADEQ. Additionally, no individual pH measurements violated the VADEQ standard during 2009. Monthly median surface temperatures ranged from 6.0 to 30.0°C and varied normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. All individual dissolved oxygen concentrations and consequently all monthly medians were above VADEQ’s 4.0 mg/L limit and were indicative of well oxygenated waters. Reduced water clarity at this site should be monitored closely to see if its source is natural or caused by human activities. Despite the lower than average clarity, all other observations continued to be indicative of good water quality at this site.

Station ID: 4

Site: Swift Creek near Bailey Bridge Middle School

Latitude: 37.4098

Longitude: 77.6165

Watershed: Swift Creek

Land use: Residential,
Commercial School

Number of Stations: 1

Number of Monitors: 2

Volunteer Hours: 44.0

Monitoring since: August 2001



This site is located on the mainstem of Swift Creek, one of the major waterways of Chesterfield County. The site lies just downstream of the Swift Creek Reservoir in the Central portion of Chesterfield County. Stream measurements and water samples were obtained from Swift Creek downhill from the recently completed Bailey Bridge Sewage Pump Station, generally on a weekly schedule. A total of 29 surveys were conducted during 2009.

Table 1-4. Monthly and annual median values for each water quality parameter measured, 2009.

Date	n	Water Depth (m)	Transparency (cm)	pH (units)	Dissolved Oxygen (mg/L)	Surface temperature (°C)	Air Temperature (°C)
January	2	*	59.0	7.0	11.5	3.8	4.8
February	4	*	81.0	6.8	11.1	6.8	13.8
March	3	*	77.0	6.5	9.7	11.5	26.0
April	3	*	≥130.0	6.5	8.1	16.0	25.0
May	3	*	104.0	6.5	5.9	24.0	27.0
June	3	*	≥130.0	7.0	4.9	26.0	27.0
July	3	*	≥130.0	6.5	4.4	27.0	29.5
August	4	*	≥130.0	6.5	4.5	26.8	28.3
September	3	*	≥130.0	7.0	5.0	21.0	26.0
November	1	*	19.0	6.5	8.3	15.0	10.5
2009 Annual Median		*	≥130.0	6.5	6.0	21.0	27.0
2008 Annual Median		0.56	94.0	7.0	7.0	19.0	23.0

Sampling of Swift Creek was conducted from January through November of 2009. The majority (17) of the sampling events occurred during cloudy or overcast days with only eight of the monitoring events were conducted during sunny and clear days. Precipitation (rain and/or sleet) was noted on four surveys. Normal “baseflow” conditions were noted on fifteen surveys with high flows observed on ten occasions throughout the spring and winter months. Low or “negligible” flows were in July and though out the month of

September. Water color ranged from clear through varying shades of brown and green. The green coloration was observed 21 times during 2009 suggesting an abundance of suspended algae in the water column. A large amount of trash was noted during the November survey. Aside from a “saltwater” smell observed in once in March and May, no perceptible odors were recorded during 2009.

Water depth was not measured at this station during 2009. Monthly median transparency values ranged from a low of 19.0 centimeters in November to over 130.0 centimeters during several months. The annual median value (≥ 130.0 cm) was among the greatest observed at all sites in 2009 and represented an improvement from the 94.0 cm annual median value of 2008. As noted the previous year, all monthly median pH values during the year, as well as individual measurements, were within the 6.0 - 9.0 unit standard range set by VADEQ. Monthly median surface temperatures ranged from 3.8 to 27.0°C and varied normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. Low individual dissolved oxygen concentrations were observed during August 2nd (3.8 mg/L) and again on September 6th (3.9 mg/L). The remaining individual dissolved oxygen concentrations and medians were at or above the VADEQ’s 4.0 mg/L threshold. As noted in the previous year, occasional low dissolved oxygen during summer months is common in streams, especially during periods of reduced flow and higher instream temperatures. Aside from these instances of low oxygen content in the stream, all other observations were suggestive of good water quality at this site.

Station ID: 5

Site: Nuttree Branch in Brandermill

Latitude: 37.4376

Longitude: 77.6487

Watershed: Swift Creek

Land use: Residential, School

Number of Stations: 1

Number of Monitors: 1

Volunteer Hours: 15.0

Monitoring since: April 2008



This site is located on Nuttree Branch in the West Central area of Chesterfield County at Swift Creek Elementary School on Genito Road. Stream measurements and water samples were obtained at least monthly, sometimes once every two weeks, near a small footbridge on a bike path accessed from the Brandermill Country Club. A total of 15 surveys were conducted during 2009.

Table 1-5. Monthly and annual median values for each water quality parameter measured, 2009.

<u>Date</u>	<u>n</u>	<u>Water Depth</u> <u>(m)</u>	<u>Transparency</u> <u>(cm)</u>	<u>pH</u> <u>(units)</u>	<u>Dissolved Oxygen</u> <u>(mg/L)</u>	<u>Surface temperature</u> <u>(°C)</u>	<u>Air Temperature</u> <u>(°C)</u>
February	1	*	50.6	6.5	12.3	5.0	10.0
March	2	*	47.1	6.5	10.7	10.1	15.8
April	2	*	56.5	6.5	10.7	16.8	15.5
May	3	*	42.0	6.5	6.6	22.0	24.5
June	1	*	51.4	6.5	5.3	26.0	27.7
July	1	*	60.2	6.5	5.6	26.0	28.2
August	1	*	64.5	6.8	5.7	25.5	26.5
September	2	*	39.5	6.5	6.7	22.3	21.8
October	1	*	48.0	6.5	9.6	18.5	17.0
November	1	*	15.8	6.5	8.4	12.5	11.0
2009 Annual Median		*	51.0	6.5	8.4	20.2	20.5
2008 Annual Median		*	56.0	6.5	7.0	22.5	24.0

Sampling of Nuttree Branch was conducted from February through November of 2009. Eight survey events occurred during sunny and clear days, six were conducted on cloudy or overcast days and one was performed in the rain. Normal “baseflow” conditions were noted on nine of the surveys and high flows were observed on two occasions in March and December. Low flows were observed frequently throughout the summer months. Water color was typically recorded as varying shades of brown with milky/turbid/foamy conditions occasionally noted. Leaves and debris were observed in September and November and trash was recorded within the channel in April and August. Pollen was

noted in May. No perceptible odors were observed during 2009. Fish, water insects and frogs were among the wildlife recorded at this site during the year.

As in 2008, water depth was not measured at this site during 2009. Monthly median transparency values ranged from a low of 15.8 centimeters in November to 64.5 centimeters in August. The annual median value (51.0 cm) was only slightly lower than the previous year's annual median (56.0 cm) and again was reflective of relatively cloudy waters. As in 2008, all monthly median pH values during the year, as well as individual measurements, were identical (6.5 units) and were within the 6.0 - 9.0 unit standard range set by VADEQ. Measurements of pH did not vary at all month to month during 2009 indicating a very stable system. Monthly median surface temperatures ranged from 5.0 to 26.0°C and varied normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. As in 2008, all individual dissolved oxygen concentrations and consequently all monthly medians continued to be above VADEQ's 4.0 mg/L limit and were indicative of well oxygenated waters. Aside from the low transparency, all other observations made during 2009 continued to indicate good water quality at this site.

Station ID: 6

Site: Spring Run behind Birdsong Lane

Latitude: 37.4073

Longitude: 77.6441

Watershed: Swift Creek

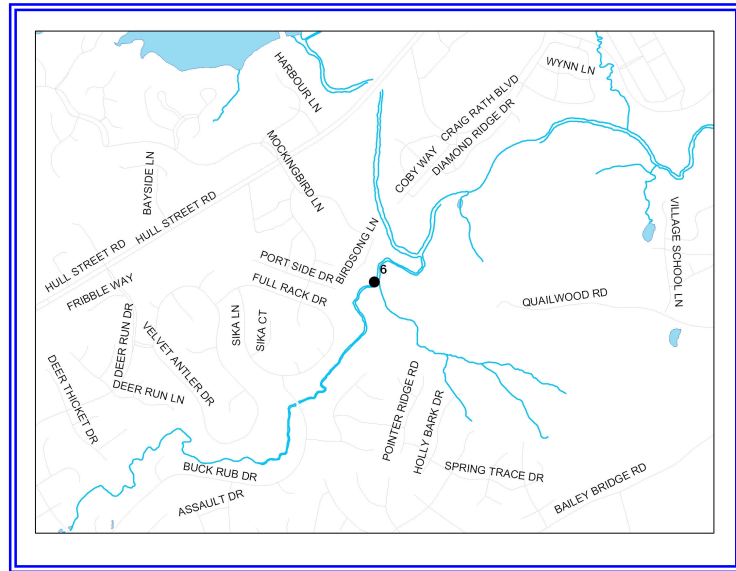
Land use: Residential

Number of Stations: 1

Number of Monitors: 2

Volunteer Hours: 20.0

Monitoring since: April 2008



This site is located on Spring Run in the West Central area of Chesterfield County at a private residence on Birdsong Lane within the Mockingbird Hills subdivision. Stream measurements and water samples were obtained at a minimum once every two at this site. A total of 20 surveys were conducted during 2009.

Table 1-6. Monthly and annual median values for each water quality parameter measured, 2009.

<u>Date</u>	<u>n</u>	<u>Water Depth (m)</u>	<u>Transparency (cm)</u>	<u>pH (units)</u>	<u>Dissolved Oxygen (mg/L)</u>	<u>Surface temperature (°C)</u>	<u>Air Temperature (°C)</u>
April	2	*	119.5	7.0	9.2	18.4	24.7
May	3	*	≥130.0	7.0	7.7	21.5	26.5
June	2	*	≥130.0	7.0	7.1	22.8	27.5
July	2	*	≥130.0	7.0	6.8	22.5	28.5
August	3	*	≥130.0	7.0	6.9	24.5	30.0
September	2	*	≥130.0	7.0	8.5	20.5	22.4
October	2	*	≥130.0	7.0	7.1	18.3	21.8
November	2	*	102.7	7.0	10.0	12.7	17.0
December	2	*	46.8	7.0	11.1	7.3	2.5
2009 Annual Median		*	≥130.0	7.0	7.6	20.5	26.3
2008 Annual Median		*	≥130.0	7.0	7.2	18.5	23.0

Sampling of Spring Run was conducted from April through December of 2009. Clear and sunny days were noted on 10 of the sampling events. Cloudy or overcast days were recorded for nine samplings and rain showers were present on one. Normal “baseflow” conditions were noted on most of the surveys (14) with only one high flow event observed during the rainy December 12th sampling. There were several instances of low flows during 2009, especially during the summer months. Clear water was observed on sixteen occasions and turbid conditions were noted on the remaining four. No perceptible odors were recorded during 2008. A large school of minnows (~ 40 – 50) were observed during the October 24th survey

As in 2008, water depth was not measured at this site during 2009. Monthly median transparency values ranged from a low of 46.8 centimeters in December to over 130.0 centimeters on multiple occasions. As observed the previous year, the annual median value (≥ 130.0 cm) was among the greatest observed at all sites during 2009 and was characteristic of a high degree of water clarity. All monthly median pH values during the year, in addition to individual measurements, were identical (7.0 units) and were well within the 6.0 - 9.0 unit standard range set by VADEQ. Measurements of pH did not vary at all month to month during 2009 indicating a very stable system. Moreover, the pH observations were identical to that reported for 2008. Monthly median surface temperatures ranged from 7.3 in December to 24.5°C in August varying normally with season. No individual values exceeded the VADEQ standard of 32.0°C during 2009. As in 2008, all individual dissolved oxygen concentrations and consequently all monthly medians were well above VADEQ's 4.0 mg/L limit and were indicative of well oxygenated waters. All together, the observations made were characteristic of continuing excellent water quality at this site.

Station ID: 8

Site: James River near Enon

Latitude: 37.3631

Longitude: 77.3091

Watershed: James River

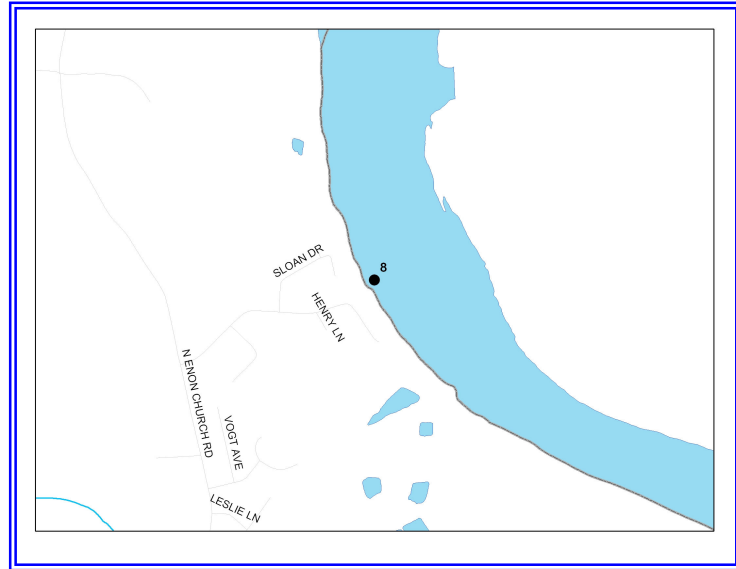
Land use: Mixed

Number of Stations: 1

Number of Monitors: 1

Volunteer Hours: 65.0

Monitoring since: August 2001



This site is located on the James River in the Eastern portion of Chesterfield County within the Mount Blanco subdivision. River measurements and water samples were obtained from a private dock located on Mount Blanco Road on a weekly basis. A total of 44 surveys were conducted during 2009.

Table 1-8. Monthly and annual median values for each water quality parameter measured, 2009.

<u>Date</u>	<u>n</u>	<u>Water Depth</u> <u>(m)</u>	<u>Secchi Depth</u> <u>(m)</u>	<u>pH</u> <u>(units)</u>	<u>Dissolved Oxygen</u> <u>(mg/L)</u>	<u>Surface temperature</u> <u>(°C)</u>	<u>Air Temperature</u> <u>(°C)</u>
January	4	1.95	0.70	7.5	11.9	5.3	5.0
February	4	1.60	0.70	7.5	11.1	7.5	10.8
March	4	1.95	0.70	7.5	10.5	12.3	11.5
April	3	1.90	0.60	7.5	9.8	15.0	20.5
May	3	1.90	0.40	7.5	8.3	20.0	23.5
June	4	2.00	0.60	7.8	7.2	26.0	27.0
July	3	1.70	0.50	8.5	9.0	29.5	27.5
August	4	2.00	0.50	8.0	7.0	30.0	30.5
September	4	2.55	0.55	7.8	7.6	24.5	23.0
October	4	2.35	0.55	8.0	8.1	19.5	20.3
November	3	2.20	0.50	7.0	10.1	14.0	20.0
December	4	2.15	0.45	7.0	11.7	6.0	8.5
2009 Annual Median		2.10	0.60	7.5	9.1	18.0	20.5
2008 Annual Median		2.00	0.60	7.5	8.6	19.0	21.0

Sampling of the James River at the Enon site was conducted from January through December of 2009. Thirty-eight sampling events occurred on cloudy or overcast days while five surveys were conducted on clear and sunny days. Rain showers were present on one survey. Normal “baseflow” conditions were noted on almost all (41) of the monitoring events. Only three observations of high water were noted, all in November and December. Light brown was the most often recorded color during 2008 with 44 observations. Dark brown was noted in January and December. Instances of trash, leaves/debris, foam/bubbles and notations of “sewage” were frequently recorded

throughout the year. Despite these observations, no perceptible odors were recorded during 2009.

Monthly median water depth at this station ranged from 1.60 meters in February to 2.55 meters in September. The annual median water depth was 2.10 meters, slightly deeper than that observed in 2008 (2.10 meters). At this site, a Secchi disk was used to measure the clarity of the river. Monthly median Secchi disk transparency values ranged from a low of 0.40 meters in May to a high of 0.70 meters in January and February, observations quite similar to those of the previous year. The annual median Secchi Disk transparency value was again 0.60 meters and indicated a slightly lower degree of water clarity. All individual measurements and monthly median pH values during the year were within the 6.0 - 9.0 unit standard range set by VADEQ. The annual median pH value (7.5 units) was identical to that of 2008. Monthly median surface temperatures ranged from 6.0 to 31.0°C and varied normally with season. All individual dissolved oxygen concentrations and monthly medians were above VADEQ's 4.0 mg/L limit and were indicative of well oxygenated waters. All of the observations at this station continued to be suggestive of generally good water quality.

Station ID: 100 (101-106)

Lake: Falling Creek Reservoir

Surface Acreage: 91

Latitude: 37.4589

Longitude: 77.4785

Watershed: Falling Creek

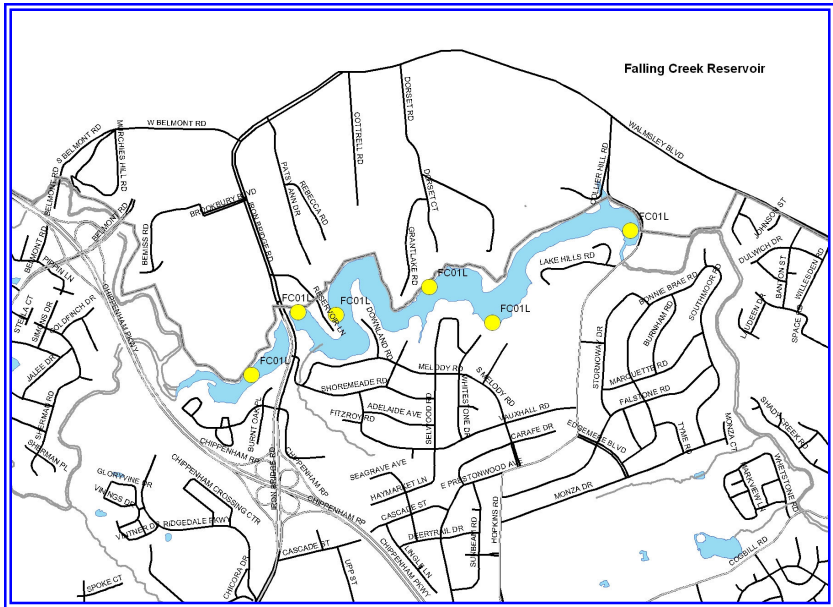
Land use: Residential and commercial

Number of Stations: 6

Number of Monitors: 7

Volunteer Hours: 31.0

Monitoring Since: Spring 2003



Falling Creek Reservoir is a manmade lake that was established in 1951. It was used as a drinking water source for Chesterfield County until 1985. Local residents concerned about the long-term health of the reservoir formed the Falling Creek Reservoir Preservation Society in 2002 and began volunteer monitoring the following year. The reservoir is surrounded by homes that have generally forested lots and small well-maintained lawns. The topography around the lake is quite steep. The watershed is a mix of commercial and residential uses. The lake is bordered by the City of Richmond to the north, while the lake itself and land to the south is in Chesterfield County.

Table 1-9. Monthly and annual median values for each water quality parameter measured, 2009.

Date	n	Water Depth (m)	Secchi Depth (m)	pH (units)	Dissolved Oxygen (mg/L)	Surface temperature (°C)	Air Temperature (°C)	Trophic State Index Value
June	6	1.80	1.17	6.8	8.3	27.0	25.8	58
July	5	1.73	0.89	7.0	8.7	28.0	25.0	62
August	5	1.53	0.64	7.0	8.3	27.0	27.0	67
September	5	1.66	0.85	6.5	7.1	22.0	16.0	62
October	4	1.57	0.84	6.5	8.3	18.0	21.8	63
November	4	1.68	0.89	6.2	9.3	13.0	12.3	62
2009 Annual Median		1.70	0.90	6.5	8.3	26.5	24.0	62
2008 Annual Median		1.55	0.79	6.5	7.9	22.0	22.0	63
2007 Annual Median		1.54	0.93	6.5	7.7	24.0	23.0	61
2006 Annual Median		1.47	1.07	6.5	7.0	21.3	22.0	59
2005 Annual Median		*	*	*	*	*	*	*
2004 Annual Median		1.69	0.80	5.5	*	25.0	24.0	63

Sampling was conducted at six sites on the Falling Creek Reservoir from June through November of 2009. Sampling occurred mostly on cloudy and/or overcast days with water conditions generally calm. Litter, leaves/debris and algae were noted throughout the year at all sites. Although occasional earthy odors were recorded, volunteers reported no perceptible odors at most sites and on most surveys. A “sewage” odor was during the

June survey at two sites. A variety of waterfowl to include Canada geese, ducks, heron, hawks and kingfishers were observed. Other wildlife such as fish and snakes were reported during the year, as were domesticated animals such as cats and dogs.

The annual median water depth for the monitoring stations on Falling Creek Reservoir was 1.70 meters, slightly deeper than observed the previous two years (1.54/1.55 meters). All monthly median pH values were within the 6.0 - 9.0 unit standard range set by VADEQ with an annual median pH (6.5 units) identical to that observed for the past three years. No individual measurements violated VADEQ standards and overall results were indicative of a very stable acid/base environment. Monthly median surface temperatures ranged from 13.0 to 28.0°C and varied normally with season. All individual, monthly and annual median dissolved oxygen concentrations were above VADEQ's 4.0 mg/L limit and were indicative of well oxygenated waters. Water color observations were most often described as green or brown during the year, with the greenish hues suggestive of suspended algal blooms. Median monthly Secchi disk depths ranged from 0.64 to 1.17 meters with an annual median of 0.90 meters. This represented a slight improvement in clarity as measured by Secchi disk depth compared to the previous year and was more similar to the annual median observed in 2007 (0.93 meters). While the Trophic State Index value also reflected this increase, the value (62) continued to characterize the lake as a borderline moderately eutrophic/eutrophic body of water (index value ~60). As in 2008, hypereutrophic conditions (index values > 70) were not observed at any time in the reservoir during 2009.

Station ID: 200 (201-204)

Lake: Walton Lake

Surface Acreage: 26

Latitude: 37.4772

Longitude: 77.6325

Watershed: Falling Creek

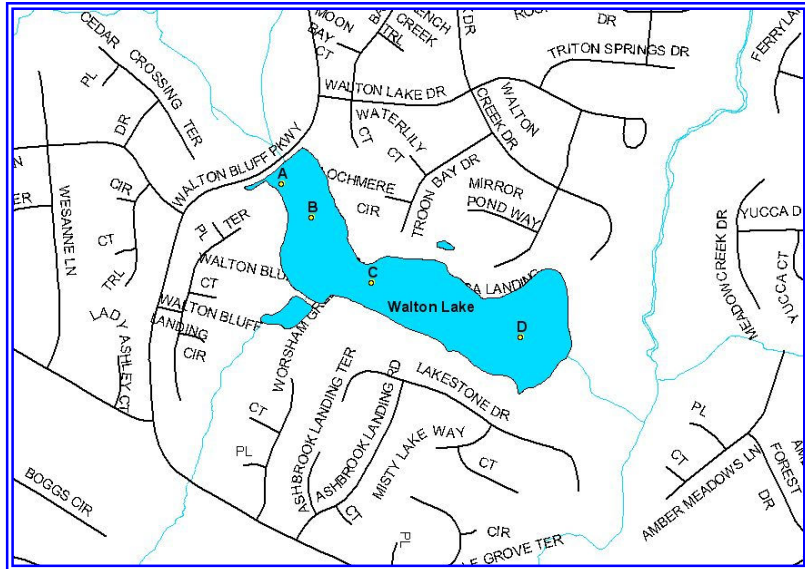
Land use: Residential

Number of Stations: 4

Number of Monitors: 1

Volunteer Hours: 16.0

Monitoring since: Spring 2004



Walton Lake is a manmade waterbody that was constructed and used as an amenity for the Isaac Walton League Hunt Club until the mid 1980's. The current dam was built in 1988 with the establishment of the Walton Lake subdivision. Homes surround the entire lake with the majority of the lakeside buffer as residential lawn. Residents utilize the lake for recreation such as boating and fishing. The entire watershed was built out with both residential and commercial development. This year marked the fourth consecutive season of sampling since monitoring was temporarily suspended in 2005.

Table 1-10. Monthly and annual median values for each water quality parameter measured, 2009.

Date	n	Water Depth (m)	Secchi Depth (m)	pH (units)	Dissolved Oxygen (mg/L)	Surface temperature (°C)	Air Temperature (°C)	Trophic State Index Value
April	4	1.41	1.06	7.0	5.3	18.0	18.0	59.3
May	4	1.33	0.92	7.0	3.5	27.0	25.0	61.3
June	4	1.44	0.65	7.0	3.1	26.0	26.5	66.2
August	4	1.32	0.67	7.0	3.1	28.0	26.0	65.8
September	4	1.24	0.36	7.5	3.7	24.5	26.0	74.7
October	4	1.31	1.03	7.0	*	15.0	22.0	59.6
2009 Annual Median		1.40	0.80	7.0	3.5	25.0	25.0	63
2008 Annual Median		1.31	0.84	7.0	4.1	22.0	23.0	63
2007 Annual Median		1.39	0.67	6.0	4.6	28.0	26.0	66
2006 Annual Median		1.44	0.84	6.0	*	24.0	23.0	63
2005 Annual Median		*	*	*	*	*	*	*
2004 Annual Median		1.31	1.00	5.5	*	28.0	23.0	60

Sampling at Walton Lake was conducted from April to October at four sites during 2009. Sampling occurred mostly on partly cloudy days (five of six surveys) with water conditions relatively calm (ripples). Algae clumps were reported throughout the year, most often concentrated at or near the shore. The pervasive algae bloom recorded and characterized during August 2008 (identified as *Cylindrospermopsis raciborskii*) improved substantially in 2009 with the algae only present at peak levels during the

month of September. Clear water was noted in May with green and/or light brown conditions recorded for the remainder of months surveyed during the year. No widespread perceptible odor was noted at any site during the 2009 surveys. Flora and fauna observed during 2009 included lily pads, bull frogs, Canadian geese, mallard ducks, herons and bald eagles.

The annual median water depth for the monitoring stations on Walton Lake was 1.40 meters, almost precisely the same as observed in 2007 (1.39 meters). Monthly median pH values during the year were all within the 6.0 - 9.0 unit standard range set by VADEQ and demonstrated stability during 2009 with only slight variations in readings. Additionally, no individual pH measurements violated the VADEQ standard during 2009. Monthly median surface temperatures ranged from 15.0 to 28.0°C and varied normally with season. Dissolved oxygen measurements made on Walton Lake during 2009 indicated four consecutive months (May through September) where low oxygen content in the surface waters (<4.0 mg/L) was noted. The annual median dissolve oxygen content was 3.5 mg/L. While low dissolved oxygen is more likely to be observed during periods of warmer weather, low concentrations at or near the surface may lead to an increased chance of fish kills. After several discussions regarding these readings and the lack of apparent consequences of low dissolved oxygen (fish kills), it was determined that the measurements most likely were a result of expired or bad reagents and not reflective of true in-lake conditions. Fresh reagents were provided in October and will be readily available for future use. Monthly median Secchi disk depths ranged from 0.36 to 1.06 meters with an annual median of 0.80 meters. While this represented a slight decrease in water clarity to the condition observed in 2008, the median was within the range of previously recorded values (0.67 – 1.00 meters). The annual median Trophic State Index value (63) was identical to the 2006 and 2008 annual median values and continued to suggest that Walton Lake is a biologically productive and mildly eutrophic body of water. As mentioned in previous reports, further observations on Walton Lake with particular emphasis on the visual assessments of algae blooms and potential for fish kills are merited.

Discussion

Measurements of water quality were made at seven stream and river stations and within two lake stations by volunteers in Chesterfield County during 2009. A summary of the parameters measured during the course of the year are presented in Table 2. As in 2008, the annual medians of pH, dissolved oxygen or temperature did not violate Virginia Department of Environmental Quality (VADEQ) surface water standards during 2009.

Table 2. A summary of parameters measured among nine stations in Chesterfield County, 2009. Asterisks indicate no measurements made for that parameter.

Station	n	Statistic	Water Depth (m)	Transparency (cm)	Secchi Depth (m)	pH (units)	Dissolved Oxygen (mg/L)	Surface Temperature (°C)	Air Temperature (°C)
James River @ Robious	25	Minimum	*	21.0	*	7.0	5.1	4.0	3.0
WaterTrends Station ID: 1		Median	*	92.0	*	7.5	7.8	15.5	22.0
Volunteer Hours: 33.5		Maximum	*	≥130.0	*	8.0	11.7	30.0	29.5
Rockwood Park	39	Minimum	*	86.0	*	6.5	10.2	4.0	4.5
WaterTrends Station ID: 2		Median	*	118.0	*	6.5	8.1	12.0	17.5
Volunteer Hours: 77.2		Maximum	*	122.0	*	7.0	12.7	25.0	28.5
Midlothian Mines	19	Minimum	*	16.2	*	6.0	5.4	5.0	9.0
WaterTrends Station ID: 3		Median	*	52.8	*	6.0	7.5	19.0	21.0
Volunteer Hours: 38.0		Maximum	*	122.0	*	7.0	11.0	30.0	31.5
Swift Creek @ Bailey Bridge	29	Minimum	*	19.0	*	6.5	3.8	1.0	-2.5
WaterTrends Station ID: 4		Median	*	≥130.0	*	6.5	6.0	21.0	27.0
Volunteer Hours: 44.0		Maximum	*	≥130.0	*	7.0	12.4	27.0	33.0
Nuttree @ Brandermill	15	Minimum	*	15.8	*	6.5	5.3	5.0	10.0
WaterTrends Station ID: 5		Median	*	51.0	*	6.5	8.4	20.2	20.5
Volunteer Hours: 15.0		Maximum	*	78.0	*	6.8	12.3	26.5	29.4
Spring Run @ Birdsong Lane	20	Minimum	*	23.6	*	7.0	6.3	5.6	2.5
WaterTrends Station ID: 6		Median	*	≥130.0	*	7.0	7.6	20.5	26.3
Volunteer Hours: 20.0		Maximum	*	≥130.0	*	7.0	11.8	25.5	31.0
James River @ Enon	44	Minimum	1.3	*	0.30	6.5	6.1	2.0	-6.0
WaterTrends Station ID: 8		Median	2.1	*	0.60	7.5	9.1	18.0	20.5
Volunteer Hours: 65.0		Maximum	2.8	*	0.90	8.5	12.7	30.0	35.0
Falling Creek Reservoir	29	Minimum	1.0	*	0.54	6.0	6.0	13.0	7.8
WaterTrends Station ID: 100		Median	1.7	*	0.86	6.5	8.3	26.5	24.0
Volunteer Hours: 31.0		Maximum	7.2	*	1.38	7.5	9.7	29.0	31.0
Walton Lake	24	Minimum	0.8	*	0.34	7.0	2.6	15.0	18.0
WaterTrends Station ID: 200		Median	1.4	*	0.81	7.0	3.5	25.0	25.0
Volunteer Hours: 16.0		Maximum	2.9	*	1.38	8.0	5.4	28.0	27.0

pH

Observations of pH indicated that the all measurements made during 2009 fell within the acceptable 6.0 to 9.0 unit range specified by the Virginia Department of Environmental Quality. There were several instances of pH at or above 8.0 units during 2009, especially during summer and early autumn at the James River sites (Robious Landing Park and Enon). These observations were most likely due to increased algal activity in the river at these sites. Increased algal activity can influence pH measurements by the removal of carbon dioxide from the water via the process of photosynthesis. This removal can lead to localized decreases in the carbonic acid concentration of the water and thus drive the pH toward the basic end of the scale. Corroborating notations of “seaweed” recorded at the Robious Landing site strongly suggest algal growth is the primary culprit of these pH observations. As noted in 2008, several individual measurements during the course of the year were at the lowermost limit of acceptability (6.0 units), a common occurrence for

surface waters in Chesterfield County due to natural conditions. Overall, pH values among all sites were similar to those observed during 2008.

Dissolved Oxygen

Dissolved oxygen concentrations were excellent among all sites with only a few observations not meeting the minimum 4.0 mg/L VADEQ standard. During the summer months, low dissolved oxygen was observed at two stations. Two individual measurements at Swift Creek (Station 4) were slightly below the minimum threshold during August 2nd (3.8 mg/L) and September 6th (3.9 mg/L). At Walton Lake (Station 200), dissolved oxygen levels were consistently low from May through September with values at or below 4.0 mg/L at all four sites during this period. Generally, low dissolved oxygen concentrations are typically noted in summer, especially in slow moving/sluggish streams or in still lakes. As the temperature increases, the ability of the water to hold oxygen diminishes and results in the lower concentrations. Most streams, rivers and lakes have areas that possess higher concentrations providing fish and aquatic life a refuge from the lack of oxygen, however if the condition is too widespread, fish kills may occur. Additionally, suspected “bad” reagents at the Walton Lake sites were believed to have influenced the readings at this station as fish kills or detrimental effects of low dissolved oxygen were not observed. These reagents were replaced for future use.

Temperature

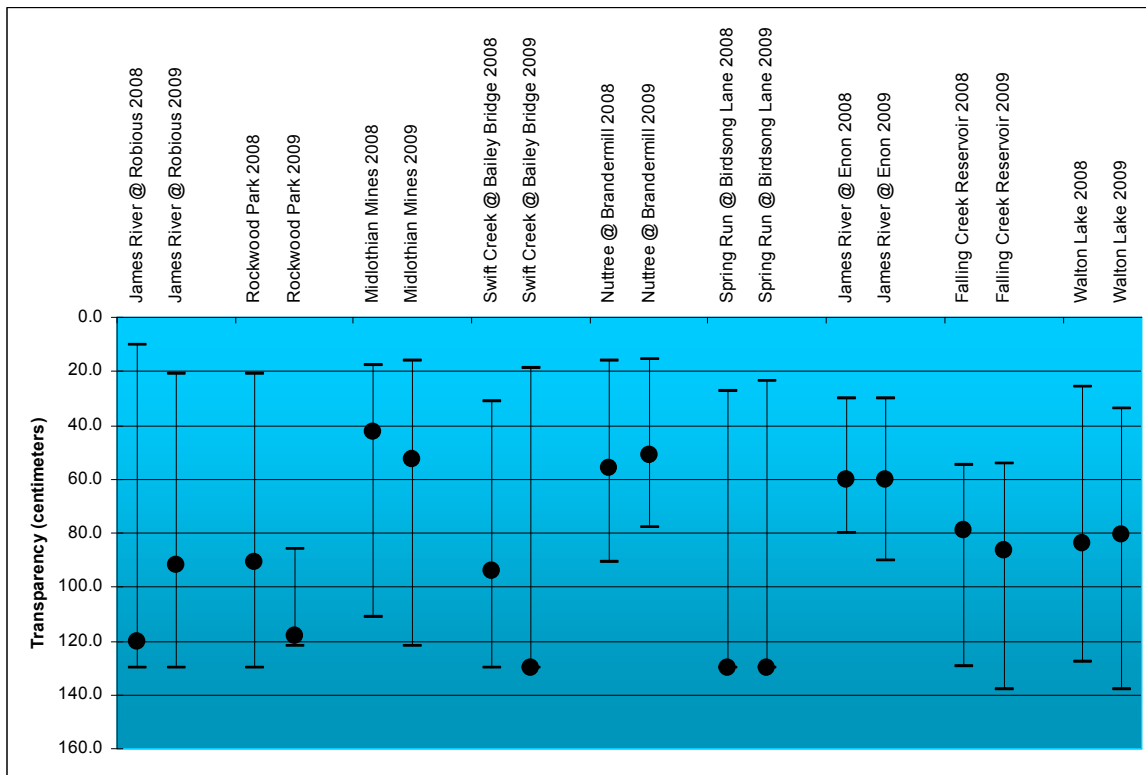
Monthly median temperatures and individual measurements varied normally according to season. There were no instances during the year where the surface water temperature exceeded the 32°C VADEQ standard. Surface water temperatures at the two James River stations (Robious Park and Enon) approached the 32°C limit during July and August with several measurements of 30°C. The temperatures observed at these sites were attributed to natural conditions related to the ability of large bodies of water to retain heat rather than thermal inputs from the watershed. For the second continuous year, the lowest monthly median temperature (3.0°C) occurred at Station 2, Tributary to Falling Creek within Rockwood Park during January. Air temperature at all stations varied normally with season during 2009.

Transparency

Water clarity was measured by use of a 120 cm turbidity tube (Stations 1-6) or a standard eight-inch Secchi disk (Stations 8, and lakes) with all readings and statistics expressed in this section as centimeters for comparison purposes (Figure 1). The greatest annual median transparencies (≥ 130.0 cm) were observed in Swift Creek at Bailey Bridge Road (Station 4) and within Spring Run (Station 6). The least clear waters were observed at the Nuttree Branch where the annual median transparency was calculated as 51.0 cm. Compared to 2008, increases in clarity as measured by annual median transparency were observed at four stations (Stations 2, 3, 4 and 100) and decreases were noted at three (Stations 1, 5 and 200) during 2009. The stations on Spring Run and the James River at Enon exhibited no change in clarity from the previous year. Turbidity is strongly

influenced by a variety of factors including abundant plant and algae growth or by suspended fine particulate matter in the stream or lake water column.

Figure 1. Annual median transparency measurements at each monitored station, 2008 – 2009. Graph depicts annual median value and range of observations. Secchi disk depths recorded at the Enon James River station, Falling Creek Reservoir and Walton Lake have been converted from meters to centimeters for comparison.



General Observations

Volunteers made visual observations of water quality and wildlife during each survey with station specific records of observations included in Appendix A. Overall, the monitored waters were stained brown to various degrees with green colors frequently recorded. Occasional reports of clear, turbid and milky colored water were also noted. Odors were rarely recorded and when noted they were usually described as “earthy”. There were two instances of “salty” odors at Swift Creek (Station 4) and two occasions where a “sewage” odor was noted at two sites on Falling Creek Reservoir during 2009. As in past reports, the most common “trash” item continued to be litter and leaves/debris from the watersheds. Additionally, algae and pollen were frequently noted on the water surface or within the water column at several sites during 2009. A variety of wildlife was observed to include numerous waterfowl, fish, frogs, snakes and bald eagles. Domestic animals such as dogs and cats were occasionally reported as well.

Low Gradient Stream Habitat Assessment

On October 8, 2009, a stream reach along Johnson Creek near the intersection of Route 10 and Enon Church Road was assessed using the Virginia Save Our Streams Low Gradient Stream Habitat Assessment Protocol. The stream reach began at the culvert immediately upstream of the Enon Church Road crossing and ended approximately 100 meters upstream of this point. The stream reach was described as “fairly straight” with “gentle bends” and had a general width of three to four meters. Moderate flow was present in the stream and the average depth of the water was approximately 0.25 meters. Pools were described as less than one meter in depth. New construction (apartments) and infrastructure (roads) were present in the immediate watershed.

The initial habitat assessment conducted in 2009 indicated a “Suboptimal” condition with the final score (150 points) near the limit of being considered “Optimal” (153 points). The stream reach exhibited excellent substrate and instream habitat characteristics (*e.g.* non-embedded cobbles, stable bottom) for the maintenance of the aquatic community. Overall pool variability was lacking with more shallow pools than deep, and the bottoms contained optimal conditions with stable substrate and a firm gravel/cobble composition. Very little sedimentation was noted throughout the reach and only two point bars were observed. Water filled over 75% of the available channel. The channel generally lacked strong sinuosity despite appearing to be in its natural state with little or no man-made alterations. The stream banks were moderately stable and well vegetated (70-90% covered). Riparian areas remained largely undisturbed with a 50 – 100 meter buffer of trees and shrubs on either side of the stream. Overall, the stream was described as being “in very good condition” by the monitor.

Future Goals

The Chesterfield WaterTrends program will continue to grow with an emphasis on maintaining current sites, expanding monitoring coverage, improving communication with monitors and broadening the suite of testing parameters. The WaterTrends program will be supported with the aid of a 2010 Virginia Department of Environmental Quality (VADEQ) Citizen Water Quality Monitoring Grant. The grant will support the purchasing of equipment and the printing of the Chesterfield WaterTrends annual report.

The 2009 VADEQ grant funded the printing of a program brochure that will allow for expanded volunteer recruitment. The brochure also serves as a reminder of basic volunteer duties and procedures for current monitors. The WaterTrends program will continue to build its communication capacity by improving the websites (Friends and Chesterfield EE) associated with the program. This includes having various materials such as data sheets, testing procedures and other information available for download. Moreover, the WaterTrends program will develop a Monitoring Minute E-Newsletter that will increase communication with prospective and current volunteers.

With an increased capacity for communication and volunteer recruitment WaterTrends will seek to expand its geographic testing range. Most of the current chemical testing

sites are in the northern, suburban parts of Chesterfield County. A goal of the WaterTrends program is to establish monitoring sites in the southern, rural and the eastern, urban parts of the county. This will create a greater range of coverage and produce a more diverse body of data for study and comparison. The data from this program will help determine trends in water quality as development in the watersheds change.

In addition to the basic suite of testing parameters WaterTrends will continue to expand its low gradient habitat assessments. WaterTrends will also seek to implement other parameters such as invasive species monitoring and offer trainings on data use and management. Training and recertification sessions will be held in the spring and fall.

We hope to utilize the data collected by the monitors in educational programs for county residents. The data can be presented to citizens and used to facilitate discussions on how they can help improve the water quality through proper lawn care techniques, pet waste disposal and other practices.

Chesterfield County WaterTrends Monitors

Much thanks and appreciation is given for the selfless volunteers who brave the elements to acquire data that assists in the protection of Chesterfield County's waters. Their stewardship is commendable. We would also like to thank our Trainer and QC Officer, Peggy Sleevi, for her countless hours both training volunteers and ensuring the quality of our data.

Station 1	The Isman Family and Sanford Beyer
Station 2	The Luck Family and Christie Bondruant
Station 3	The Perdue Family
Station 4	The Roussos Family
Station 5	Marcie Williams
Station 6	Tom and Gretchen Cole
Station 8	Jim Turner
Station 100	The Falling Creek Reservoir Preservation Society
Station 200	Dr. John Burmeister